CLAIMS

What is claimed is:

1. A distributed feedback laser, comprising:

a die having a front cleaved facet with an anti-reflection coating and a rear cleaved facet;

a laser stripe mounted on said die, said laser stripe being tilted at an angle relative to at least one of said front cleaved facet and said rear cleaved facet; and

a grating mounted on said die approximately perpendicular to and optically coupled to said laser stripe.

2. The distributed feedback laser of claim 1, wherein said die has a length, L, and said grating has an effective grating coupling coefficient, κ.

3. The distributed feedback laser of claim 2, wherein said angle is selected to achieve a desired statistical yield of lasers having a minimum side mode suppression ratio for a target grating strength.

4. The distributed feedback laser of claim 3, wherein said minimum side mode suppression ratio is about 30.

5. The distributed feedback laser of claim 1, wherein said anti-reflection coating is a single layer anti-reflection coating.

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6. The distributed feedback laser of claim 1, wherein said angle is at least two degrees.

7. The distributed feedback laser of claim 1, wherein said angle is selected to achieve an effective facet reflectivity of less than 0.1%.

8. The distributed feedback laser of claim 1, wherein said angle is selected to optimize a desired front-to-rear power ratio.

9. The distributed feedback laser of claim 1, wherein said laser stripe comprises either a ridge waveguide or a buried heterostructure.

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10. A method of fabricating a distributed feedback laser comprising the steps of:

growing an initial epitaxial layer on a base layer, said base layer having at least one cleavage plane;

defining a grating at a selected misalignment angle with respect to said at least one cleavage plane; and

forming a laser stripe perpendicular to said grating.

11. The method of claim 10 further comprising the step of cleaving said base wafer into a plurality of bars, each bar having a front and a rear facet.

12. The method of claim 11 further comprising the step of coating said front facet with an anti-reflective coating.

13. The method of claim 12 wherein said anti-reflective coating is a single layer anti-reflective coating.

14. The method of claim 12 further comprising the step of dicing each of said bars into at least two laser devices.

15. The method of claim 14 wherein at least one of said laser devices has a length, L, and said grating has an effective grating coupling coefficient, κ.

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16. The method of claim 15 wherein said misalignment angle is selected to achieve a desired statistical yield of lasers having a minimum side mode suppression ratio for a target grating strength, defined as the κL product.

17. The method of claim 16 wherein said minimum side mode suppression ratio is about 30.

18. The method of claim 16 wherein said misalignment angle is at least two degrees.

19. The method of claim 16 wherein said misalignment angle is selected to achieve an effective facet reflectivity of less than 0.1%.

20 The method of claim 16 wherein said misalignment angle is selected to optimize a desired front-to-rear power ratio.

21. The method of claim 20 wherein said front-to-rear power ratio falls in the range from 1 to 100.

22. The method of claim 20 wherein said anti-reflection coating is a single layer anti-reflection coating.

23. The method of claim 20 wherein said tilt angle is at least two degrees.

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24. The method of claim 16 wherein said laser stripe comprises either a ridge waveguide or a buried heterostructure.

25. The method of claim 10 wherein said step of growing the initial epitaxial layer is accomplished using metal-organic chemical vapor deposition.

26. The method of claim 10 wherein said step of growing the initial epitaxial layer is accomplished using molecular beam epitaxy.

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27. A method of improving a yield of distributed feedback (DFB) lasers comprising:

forming a plurality of DFB lasers, each laser being a laser stripe oriented at an angle within a range of angles with respect to a cleaved front facet and a cleaved rear facet of each DFB laser, said plurality of DFB lasers being of a sufficient number to sample a likely range of a grating strength and a phase at said front facet of each of said plurality of lasers;

for each laser, coating said front facet with an anti-reflection coating;

determining at least one optical characteristic of said lasers to form calibration data;

determining an effect of said tilt angle on a statistical yield of at least one optical characteristic of said lasers; and

selecting a minimum tilt angle to achieve a desired statistical yield of DFB lasers having said at least one optical characteristic.

28. The method of claim 27, wherein said at least one optical characteristic is a minimum side mode suppression ratio (SMSR).

29. The method of claim 28, wherein said minimum SMSR is about 30 or greater.

30. The method of claim 27, wherein said AR coating is a single layer AR coating that has a reflectivity of about 1% or greater and said angle is selected to achieve an effective reflectivity no greater than 0.1%.

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31. The method of claim 27, wherein said DFB laser is a phase-shifted DFB laser and said at least one optical characteristic is a front-to-rear power ratio.

32. The method of claim 27, wherein said angle is selected to achieve a desired yield for a plurality of lasers having DFB wavelengths spaced apart over a wavelength range.

33. The method of claim 32, wherein said wavelength range encompasses a plurality of ITU grid wavelengths.

34. The method of claim 33, wherein said angle and said facet reflectivity are selected to achieve an effective facet reflectivity of said front facet of less than 1% for each of said plurality of lasers.

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